

## Ecological site F227XY103AK Stream Terraces Frozen Kuslinad

Accessed: 05/02/2024

### General information

**Provisional.** A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

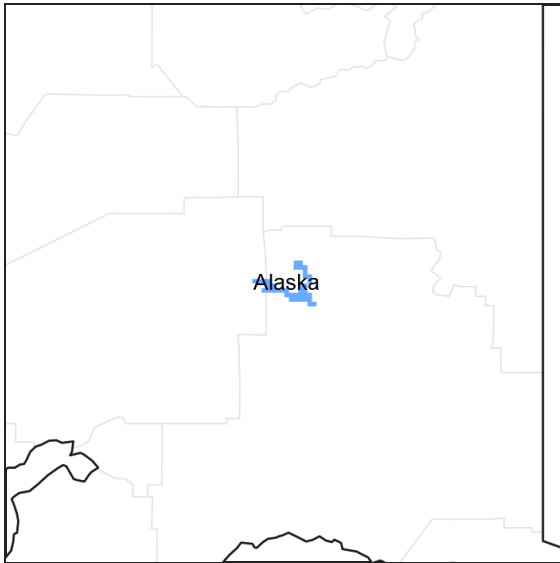


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

Table 1. Dominant plant species

Tree	(1) <i>Picea glauca</i> (2) <i>Picea mariana</i>
Shrub	(1) <i>Betula glandulosa</i>
Herbaceous	(1) <i>Carex lugens</i>

### Physiographic features

This site consists of level to moderately sloping, poorly drained stream terraces with shallow to very shallow permafrost. Elevation is generally 1850 to 2600 feet (564 to 792 m).

In the Gulkana River area, this site occurs along all reaches of the River except for the upper Middle Fork. This site is probably widespread on stream terraces at mid elevations throughout the Copper River basin.

Table 2. Representative physiographic features

Landforms	(1) Terrace
Flooding frequency	Rare to none
Elevation	564–792 m

Slope	0–5%
Water table depth	0–30 cm
Aspect	Aspect is not a significant factor

## Climatic features

The subarctic continental climate of this site is characterized by long cold winters and short warm summers. Mean January temperature is -2 °F.; mean July temperature is 54 °F. Mean annual precipitation ranges from 15 to 21 inches. Annual snowfall ranges from 54 to 102 inches. The frost-free season is about 60 to 80 days (28 °F. base temperature). The growing season varies greatly from year to year and frosts can occur during any summer month.

**Table 3. Representative climatic features**

Frost-free period (average)	0 days
Freeze-free period (average)	0 days
Precipitation total (average)	0 mm

## Influencing water features

### Soil features

Soils on this site are very poorly or poorly drained and very shallow or shallow to permafrost. They typically have an organic mat 8 to 16 inches (20 to 41 cm) thick over stratified sandy and silty alluvium. Depth to permafrost ranges from 4 to 32 inches (10 to 81 cm) below the mineral soil surface. A water table is perched on the impermeable permafrost; depth to the top of the water table ranges from within the organic mat to about 12 inches (15 cm) below the mineral surface. A reduced matrix or common reduction mottles are present above the permafrost in most profiles. Principal soils are Klasi, Mendna, Cryaquepts, Kuslinad, and Chelina (Organic mat thickness mostly ranges from 2 to 15 inches [5 to 38 cm].)

Depth to permafrost is variable; ranges from the mineral surface to greater than 60 inches (greater than 152 cm).

**Table 4. Representative soil features**

Family particle size	(1) Loamy
Soil depth	10–81 cm

## Ecological dynamics

Wild fire impacts on this site are complex and difficult to predict. In most instances, fire would kill the spruce trees and destroy much if not all of the woodland overstory. Following fires of moderate severity, sprouting from root crowns and other underground plant parts should initially produce scrub vegetation similar to the understory of the potential natural plant community. A severe burn, one in which the moss-organic layer was consumed to mineral soil, would allow for the establishment of pioneering lichens, mosses, and herbs on the soil surface. With the insulating moss-organic layer burned off, the soil temperatures would be expected to increase, resulting in melting of the permafrost and a drop in the water table. Site productivity should improve markedly at this point and then gradually decrease once again as the moss-organic layer re-establishes and thickens. Stand replacement will depend to a large degree on proximity of seed sources, the severity of burn, and suitability of the seed bed. In the boreal forest zone, repeated fires generally favors the establishment of *Picea mariana* over *Picea glauca*. Based on observations and data collected in the Gulkana River area, this site is the end point of flood plain-stream terrace site progression and vegetation succession. As the terrace is elevated above the level of flooding by down-cutting of the channel and sediment accretion, this site develops from 172Xy101AK - Loamy High Flood Plains and 172Xy102AK - Loamy High Flood Plains, Frozen. As the surface moss layer and organic mat continues to develop and permafrost rises within the soil profile, the original *Picea glauca* stand dies-off and is replaced by less productive *P. glauca* and *P. mariana*. The understory changes from *Salix* spp. dominance on site 172Xy101AK or *Alnus tenuifolia* on site 172Xy102AK to dominance by *Betula glandulosa*, various ericaceous shrubs, and

feathermosses. Apparently, *Carex lugens* becomes abundant in the herb layer only in places that have remained undisturbed by wild fire for an extended period of time. Prior to this point, vegetation on this site consists primarily of Spruce/shrub birch woodland.

## State and transition model

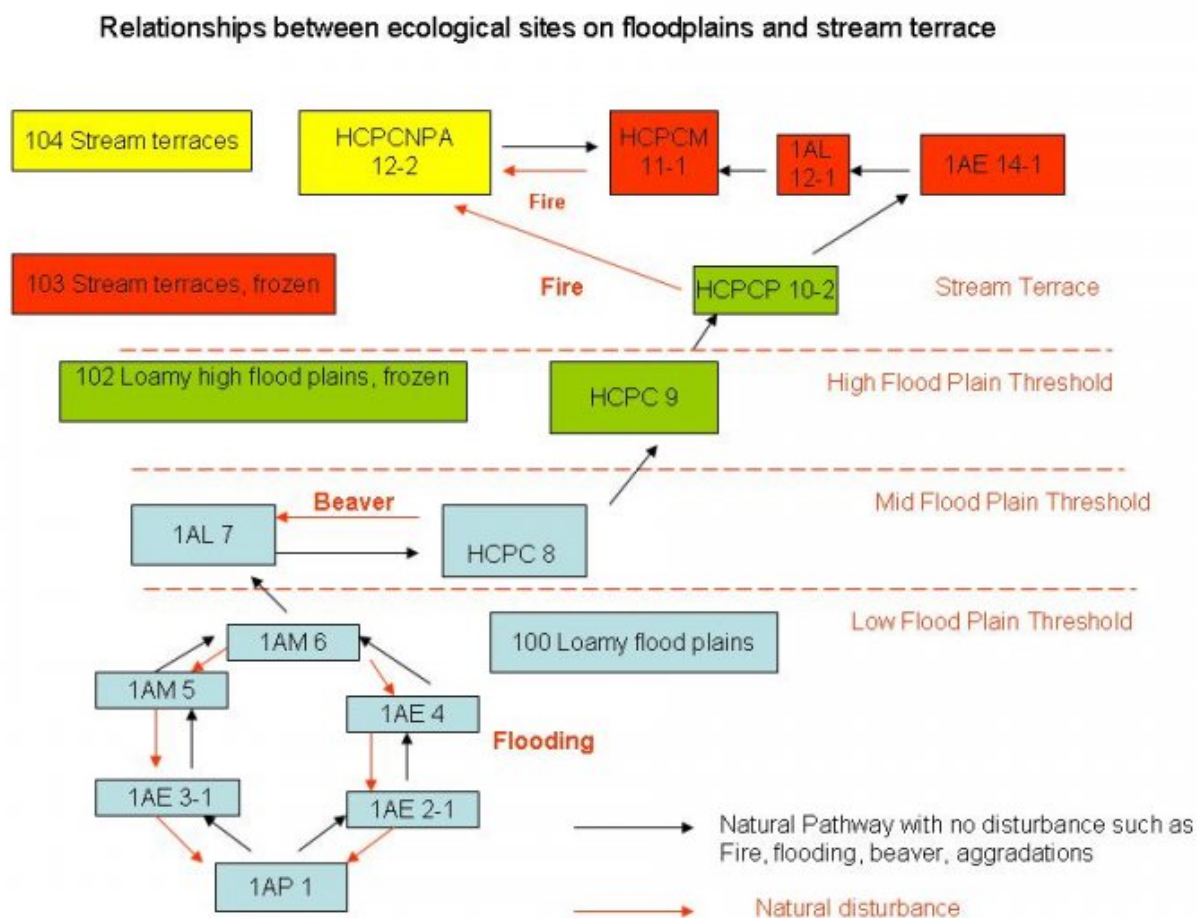


Figure 3. Frozen floodplain and terraces

## State 1 Spruce/Spruce Muskeg Sedge Open Forest

### Community 1.1 Spruce/Spruce Muskeg Sedge Open Forest

Spruce/spruce muskeg sedge open forest consists of open to moderately open stands of spruce, with occasional woodland and moderately closed stands. Compared to Spruce/shrub birch woodland and Spruce/lichen woodland, herbs are abundant to very abundant in the ground layer of Spruce/spruce muskeg sedge open forest. Spruce/spruce muskeg sedge open forest represents late seral to potential vegetation on sites where it occurs. Sites that have remained undisturbed by wildfire for a long period generally have shallow permafrost and a perched water table. This type develops from Low shrub birch scrub and Spruce/shrub birch woodland. The Riparian-Wetland Status Classification varies from upland to Palustrine needle-leaved evergreen scrub-shrub and forested (Cowardin et al. 1979)

**Forest overstory.** Overstory composition varies from *Picea mariana* to mixed *P. mariana* and *P. glauca*. Tree canopy cover ranges from 10 to 50 percent. Trees are typically 15 to 35 feet (4.6 to 10.7 m) in height and 4.0 to 6.5 inches (10.0 to 16.5 cm) in diameter at ground level. Trees and small stands to 60 feet (18 m) in height occasionally occur. Basal area of trees varies considerably between stands, ranging from 30 to 125 feet<sup>2</sup>/acre (6.9 to 28.7

m<sup>2</sup>/ha) in 13 sample stands.

**Forest understory.** *Carex lugens* typically ranges from 15 to occasionally over 70 percent canopy cover. Other important herbs include *Petasites frigidus*, *Equisetum* spp., *Rubus chamaemorus*, *Eriophorum brachyantherum*, and *Arctagrostis latifolia*. Mosses and lichens are well-represented to more commonly abundant on the soil surface.

Like other spruce cover types, medium, low, and dwarf shrubs are also important in Spruce/spruce muskeg sedge open forest. Total shrub canopy cover ranges from around 30 to 70 percent or more. *Betula glandulosa* approximately 4.5 to 6 feet (0.4 to 1.8 m) in height and *Ledum* spp. and *Vaccinium uliginosum* 2 to 3.5 feet (0.6 to 1.1 m) in height are the most important shrubs. In most stands, *Salix planifolia* also is a common medium shrub. *S. glauca* and other tall willows are common to well-represented in many stands. Common low shrubs include *V. vitis-idaea*, *Empetrum nigrum*, *Arctostaphylos rubra*, and *S. myrtillofolia*.

**Table 5. Ground cover**

Tree foliar cover	10-50%
Shrub/vine/liana foliar cover	1-60%
Grass/grasslike foliar cover	1-80%
Forb foliar cover	1-30%
Non-vascular plants	2-90%
Biological crusts	0%
Litter	1-50%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	1-15%

**Table 6. Canopy structure (% cover)**

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	–	–	–
>0.15 <= 0.3	–	–	–	–
>0.3 <= 0.6	–	–	20-45%	20-45%
>0.6 <= 1.4	–	35-75%	–	–
>1.4 <= 4	–	–	–	–
>4 <= 12	10-30%	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

**Figure 4. Plant community growth curve (percent production by month).**  
AK0001, MLRA 172 Balsam poplar-whitespruce/thinleaf alder. Mixed forest shrub on floodplains..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	0	15	30	45	10	0	0	0	0

**State 2**  
**Low Shrub Birch Scrub**

## Community 2.1 Low Shrub Birch Scrub

Spruce/shrub birch woodland consists of woodland to occasionally moderately open stands of spruce. Distribution and extent: river corridor and uplands; one of the most extensive and widely distributed cover types in the survey area Elevation: 1,850 to 3,000 feet (564 to 914 m) Landforms: nearly level stream terraces; nearly level to strongly sloping lacustrine terraces; and moderately steep to steep hill slopes, escarpments, and alluvial fans Principal soils: all mineral soils on stream terraces and uplands in the survey area; organic mat thickness ranges from 0 to 10 inches (0 to 25 cm) Spruce/shrub birch woodland is best described as mid to late seral. This type develops on a wide variety of sites following fire, either from Low shrub birch scrub or Low shrub birch/lichen scrub. On sandy and gravelly soils on stream terraces, outwash plains, and strandline deposits, and other sites with a short fire return interval, Spruce/shrub birch woodland is probably the potential. Elsewhere, continued succession may lead to Spruce/spruce muskeg sedge open forest and possibly Black spruce/closed sheath cottongrass woodland. Riparian-Wetland Status Classification: almost always upland; occasionally Palustrine needle-leafed evergreen scrub-shrub and forested (Cowardin et al. 1979)

**Forest overstory.** Overstory composition varies from *Picea glauca* to mixed *P. glauca* and *P. mariana*. Tree canopy cover ranges from 10 to 55 percent. Trees are typically 15 to 35 feet (4.6 to 10.7 m) in height and 4 to 6.5 inches (10 to 16.5 cm) in diameter at ground level. Trees and small stands to 60 feet (18.3 m) in height occasionally occur. Basal area of trees varies considerably between stands, ranging from 23 to 130 feet<sup>2</sup>/acre (5.3 to 29.8 m<sup>2</sup>/ha) in 18 sample stands. Snags and charred boles and downfall are well-represented in burned stands.

**Forest understory.** The understory is dominated by abundant to very abundant medium, low, and dwarf shrubs. There are usually two relatively distinct shrub layers. The upper layer is approximately 4.5 to 6 feet ( 1.4 to 1.8 m) in height. The overall dominant medium shrub is *Betula glandulosa*; however, *Salix planifolia* is common in most stands. *S. glauca* and other tall willows are common to well-represented in many stands. The lower shrub layer is composed of a number of low and dwarf ericaceous shrub 0.5 to 3.5 feet (0.2 to 1.1 m) in height. Common to abundant species include *Ledum* spp., *Vaccinium uliginosum*, *V. vitis-idaea*, *Empetrum nigrum*, and *Arctostaphylos rubra*. Total shrub canopy cover ranges from around 45 to 90 percent or more.

Herbs generally are of minor importance in Spruce/shrub birch woodland. Commonly occurring species include *Petasites frigidus*, *Arctagrostis latifolia*, *Equisetum* spp., *Rubus chamaemorus*, and *Carex lugens*. Mosses and lichens on the ground surface range from sparse, scattered patches to nearly continuous, luxuriant cover, depending on fire history and stand age.

Table 7. Ground cover

Tree foliar cover	1-30%
Shrub/vine/liana foliar cover	1-60%
Grass/grasslike foliar cover	1-35%
Forb foliar cover	1-15%
Non-vascular plants	1-80%
Biological crusts	0%
Litter	1-25%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	1-3%

Figure 5. Plant community growth curve (percent production by month). AK0001, MLRA 172 Balsam poplar-whitespruce/thinleaf alder. Mixed forest shrub on floodplains..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	0	15	30	45	10	0	0	0	0

### State 3

#### Low Shrub Birch Scrub

##### Community 3.1

#### Low Shrub Birch Scrub

Low shrub birch scrub consists of moderately open to closed stands of medium and low shrubs dominated by *Betula glandulosa*, *Ledum* spp., and *Vaccinium uliginosum*. Distribution and extent: widely distributed throughout the uplands; extensive Elevation: 1,900 to 3,500 feet (579 to 1,067 m) Landforms: primarily level to moderately steep stream terraces, lacustrine terraces, and hill slopes; steep mountain slopes; all aspects Principal soils: various (This type occurs on most mineral upland and stream terrace soils in the area and occasionally on organic soils.) Depth to permafrost: permafrost usually absent; where present, ranges from 0 to 50 inches (0 to 127 cm) or more below the mineral surface. Depth to seasonally high water table: usually greater than 60 inches (greater than 152 cm); many stands with water table at 0 to 40 inches (0 to 102 cm) or deeper In most places, Low shrub birch scrub appears to be an early, post-fire seral stage leading to Spruce/shrub birch woodland or Spruce/spruce muskeg sedge open forest. Most stands have common to well-represented scattered trees and unburned woodland to reseed the stand, and *Picea glauca* and *P. mariana* seedlings and saplings are common. At higher elevations and on steep slopes, seed trees and seedlings are generally absent to uncommon, suggesting that progression toward the woodland stages in these stands may take a long time. Above about 2,700 feet (823 m), Low shrub birch scrub, where present, is probably the potential vegetation. The *Carex lugens* understory phase described above appears to be a condition associated with crown fires in which the woodland understory was essentially unburned or only lightly burned. These are the stands which more than likely have permafrost and a water table present in the soil profile. Riparian-Wetland Status Classification: usually upland; occasionally Palustrine broad-leaved deciduous scrub-shrub, saturated, mineral and organic (Cowardin et al. 1979)

**Forest understory.** Dwarf shrub, primarily *Vaccinium vitis-idaea* and *Empetrum nigrum*, also are usually abundant. *B. glandulosa* is typically 4.5 to 7 feet (1.4 to 2.1 m) in height and forms an irregular, broken upper shrub layer. Other shrubs are usually about 3 feet (0.9 m) in height or less and fill in the spaces between and below the birch. In many stands, *Picea glauca* and/or *P. mariana* saplings, small trees, and relic trees are common to well-represented. Canopy cover of the upper shrub layer ranges from 25 to 70 percent. Total shrub canopy cover is usually between 50 and 90 percent.

In most stands, the herb layer is sparse to open. The number of different herb species is usually fairly high; however, no species are particularly abundant. Important herbs include *Equisetum* spp., *Petasites frigidus*, *Epilobium angustifolium*, *Arctagrostis latifolia*, and *Calamagrostis canadensis*. A mosaic of feathermoss, lichen, and litter covers the ground surface. In some stands on more mesic sites, *Carex lugens* is abundant to very abundant, and lichen is usually considerably more abundant. Most stands show evidence of recent burns, and snags and woody litter are common to well-represented.

**Table 8. Ground cover**

Tree foliar cover	2-10%
Shrub/vine/liana foliar cover	1-75%
Grass/grasslike foliar cover	1-70%
Forb foliar cover	1-35%
Non-vascular plants	1-70%
Biological crusts	0%
Litter	4-35%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%

Bedrock	0%
Water	0%
Bare ground	0%

## Additional community tables

### Recreational uses

Deteriorating stands of *Picea glauca* in the transitional zone between high flood plains and frozen stream terraces often contain abundant downfall suitable for firewood. Standing dead trees will provide a future source of firewood.

### Other information

Based on observations and data collected in the Gulkana River area, this site is the end point of flood plain-stream terrace site progression and vegetation succession. As the terrace is elevated above the level of flooding by down-cutting of the channel and sediment accretion, this site develops from 172Xy101AK - Loamy High Flood Plains and 172Xy102AK - Loamy High Flood Plains, Frozen. As the surface moss layer and organic mat continues to develop and permafrost rises within the soil profile, the original *Picea glauca* stand dies-off and is replaced by less productive *P. glauca* and *P. mariana*. The understory changes from *Salix* spp. dominance on site 172Xy101AK or *Alnus tenuifolia* on site 172Xy102AK to dominance by *Betula glandulosa*, various ericaceous shrubs, and feathermosses. Apparently, *Carex lugens* becomes abundant in the herb layer only in places that have remained undisturbed by wild fire for an extended period of time. Prior to this point, vegetation on this site consists primarily of Spruce/shrub birch woodland.

172Xy104AK - Stream Terraces: slightly elevated ridges and other microsites on similar stream terrace positions or areas burned by wild fire in the not to distant past; well drained soils without permafrost; Spruce/shrub birch woodland vegetative potential with Spruce/lichen woodland present in many places.

172Xy105AK - Terraces, Wet: slightly lower and concave microsites on similar stream terrace positions; hummocky micro-topography; very poorly drained soils with very shallow permafrost and a perched water table often within the surface organic mat; Black spruce/closed sheath cottongrass woodland vegetative potential.

### Contributors

Michelle Schuman

### Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

### Indicators

1. **Number and extent of rills:**

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2. **Presence of water flow patterns:**

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3. **Number and height of erosional pedestals or terracettes:**

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

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5. **Number of gullies and erosion associated with gullies:**

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6. **Extent of wind scoured, blowouts and/or depositional areas:**

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7. **Amount of litter movement (describe size and distance expected to travel):**

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

Dominant:

Sub-dominant:

Other:

Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth ( in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

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17. **Perennial plant reproductive capability:**

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